

WHAT IS CLAIMED IS:

1. A modification method of a surface layer of a molded resin article which comprises the steps of:

placing, in a first closed space, an organic compound having sublimation

5 properties and an affinity for a resin of the molded resin article to be coated;

on the other hand, placing the molded resin article in a second closed space;

controlling a temperature in the second closed space so as to be equal to or higher than the temperature in the first closed space;

bringing a pressure in the first closed space to a saturated sublimation
10 pressure state of the organic compound;

controlling a pressure in the second closed space so as to be equal to or lower than the pressure in the first closed space;

subsequently, connecting the first closed space to the second closed space to form a third closed space in which the first closed space is combined with the second closed
15 space, and further controlling the temperature and the pressure so that the whole of the third closed space may be in the saturated sublimation pressure state of the organic compound;

allowing a vapor of the organic compound with which the first closed space before the connection is filled to diffuse into the second closed space before the connection;

uniformly depositing the vapor of the organic compound on the surface of
20 the molded resin article; and

allowing the deposited organic compound to penetrate/disperse from the surface of the molded resin article into its inside.

2. The modification method of the resin surface layer according to claim 1 which comprises the steps of:

placing the organic compound having the sublimation properties and the affinity for the resin of the molded resin article to be coated in a first vacuum container provided with a pipe to an exhaust system, an introducing portion of the organic compound and a connection pipe to a second vacuum container, closing the organic compound

5 introducing portion and the connection pipe to the second vacuum container, reducing the pressure in the first vacuum container through the exhaust system to a saturated sublimation pressure of the organic compound at a temperature which is equal to or higher than room temperature and which does not exceed a thermal decomposition temperature of the organic compound and/or the resin, and raising the temperature in the first vacuum container up to

10 the above temperature;

on the other hand, placing the molded resin article in the second vacuum container provided with a pipe to an exhaust system, an introducing portion of the molded resin article and a connection pipe to the first vacuum container, and closing the molded resin article introducing portion and the connection pipe to the first vacuum container;

15 controlling the temperature in the second vacuum container so as to be equal to or higher than the temperature in the first vacuum container;

bringing the pressure in the first vacuum container to a saturated sublimation pressure state of the organic compound;

controlling the pressure in the second vacuum container so as to be equal to

20 or lower than the pressure in the first vacuum container;

subsequently, connecting the first vacuum container to the second vacuum container via a mutual connection pipe to form the third closed space in which the first closed space in the first vacuum container is combined with the second closed space in the second vacuum container, and further controlling the temperature and the pressure so that the whole

of the third closed space may be in the saturated sublimation pressure state of the organic compound;

allowing the vapor of the organic compound with which the first vacuum container before the connection is filled to diffuse into the second vacuum container before
5 the connection;

uniformly depositing the vapor of the organic compound on the surface of the molded resin article;

heating for a predetermined time to allow the deposited organic compound to penetrate/disperse from the surface of the molded resin article into its inside;

10 closing the connection pipe which connects the first vacuum container to the second vacuum container;

controlling the temperature and the pressure in the second vacuum container for a predetermined time so that the vapor of the organic compound which remains inside the second vacuum container may penetrate/disperse from the surface of the molded resin article
15 into its inside;

when the vapor of the organic compound excessively exists in the second vacuum container, exhausting the vapor of the organic compound from the second vacuum container through the exhaust system; and

then returning the temperature of the molded resin article in the second
20 vacuum container to ordinary temperature.

3. The modification method of the resin surface layer according to claim 2 wherein:

instead of returning the temperature of the molded resin article in the second vacuum container to ordinary temperature in a final stage,

the molded resin article is transported under a reduced pressure into a third vacuum container which is disposed adjacent to the second vacuum container via a gate valve and in which the pressure can independently be controlled, and the temperature of the molded resin article is then returned to ordinary temperature.

- 5 4. A modification apparatus for a resin surface layer which comprises:
 - a tightly closable first vacuum container for placing an organic compound having sublimation properties and an affinity for a resin of the molded resin article to be coated in a saturated sublimation pressure state;
 - a tightly closable second vacuum container for placing the molded resin
 - 10 article in the saturated sublimation pressure state of the organic compound;
 - a connection pipe for connecting the first vacuum container to the second vacuum container;
 - an opening/closing mechanism of the connection pipe;
 - an exhaust system for independently adjusting the pressure in the first
 - 15 vacuum container;
 - an exhaust system for independently adjusting a pressure in the second vacuum container; and
 - heating means for allowing the organic compound to penetrate/disperse into the molded resin article, after the organic compound sublimates and a vapor of the organic
 - 20 compound is deposited on the surface of the molded resin article.

5. The modification apparatus of the resin surface layer according to claim 4 which further contains:

a stirring mechanism for stirring the molded resin article of a powder form.

6. The modification apparatus of the resin surface layer according to claim 4

25 which further contains:

a wind-up mechanism for winding up the molded resin article of a form selected from a textile form, a fiber form and film form around a reception side reel from a supply side reel under reduced pressure.

7. A coloring apparatus for a resin surface layer which comprises:

5 a tightly closable first vacuum container for placing a dyestuff having sublimation properties and an affinity for a resin of the molded resin article to be colored in a saturated sublimation pressure state;

a tightly closable second vacuum container for placing the molded resin article in the saturated sublimation pressure state of the dyestuff;

10 a connection pipe for connecting the first vacuum container to the second vacuum container;

an opening/closing mechanism of the connection pipe;

an exhaust system for independently adjusting the pressure in the first vacuum container;

15 an exhaust system for independently adjusting a pressure in the second vacuum container; and

heating means for allowing the dyestuff to penetrate/disperse into the molded resin article, after the dyestuff sublimes and a vapor of the dyestuff is deposited on the surface of the molded resin article.

20 8. The coloring apparatus of the resin surface layer according to claim 7 which further contains:

a stirring mechanism for stirring the molded resin article of a powder form.

9. The coloring apparatus of the resin surface layer according to claim 7 which further contains:

a wind-up mechanism for winding up the molded resin article of a form selected from a textile form, a fiber form and film form around a reception side reel from a supply side reel under reduced pressure.

10. A resin article having a surface layer modified by a modification method

5 comprising the steps of:

placing, in a closed space, an organic compound having sublimation properties and an affinity for a resin of the resin article to be coated, and the resin article;

bringing the closed space to a saturated sublimation pressure state of the organic compound;

10 uniformly depositing a vapor of the organic compound on the surface of the resin article; and

allowing the deposited organic compound to penetrate/disperse from the surface of the resin article into its inside.

11. The molded resin article of claim 10, wherein the resin article is a plastic
15 lens.

12. The molded resin article of claim 10, wherein the resin article is a resin coat lens.

13. The molded resin article of claim 10, wherein the resin article is a plastic film.

20 14. The molded resin article of claim 10, wherein the resin article is a fiber.

15. The molded resin article of claim 10, wherein the resin article is a plastic optical fiber.

16. A resin article having a surface layer modified by a modification method comprising the steps of:

placing, in a closed space, an organic compound having sublimation properties and an affinity for a resin of the resin article to be coated, and the resin article;

bringing the closed space to a saturated sublimation pressure state of the organic compound;

5 uniformly depositing a vapor of the organic compound on the surface of the resin article; and

allowing the deposited organic compound to penetrate/disperse from the surface of the resin article into its inside;

wherein a dyestuff having the sublimation properties and the affinity for the resin of the resin article to be coated is used as the organic compound to modify and simultaneously color the surface layer of the resin article.

17. The molded resin article of claim 16, wherein the resin article is a plastic lens.

18. The molded resin article of claim 16, wherein the resin article is a resin coat lens.

19. The molded resin article of claim 16, wherein the resin article is a plastic film.

20. The molded resin article of claim 16, wherein the resin article is a fiber.

21. The molded resin article of claim 16, wherein the resin article is a plastic optical fiber.